ANALYSIS OF THE MEASUREMENT AND MODELING OF A DIGITAL INVERTER BASED ON A FERROELECTRIC TRANSISTOR

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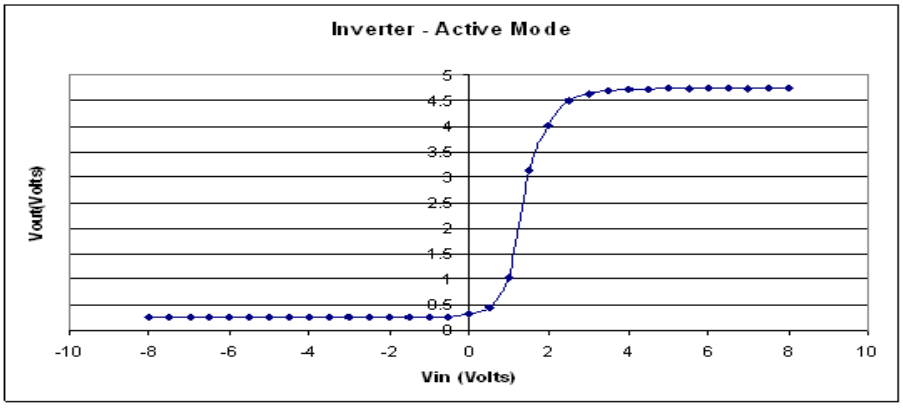
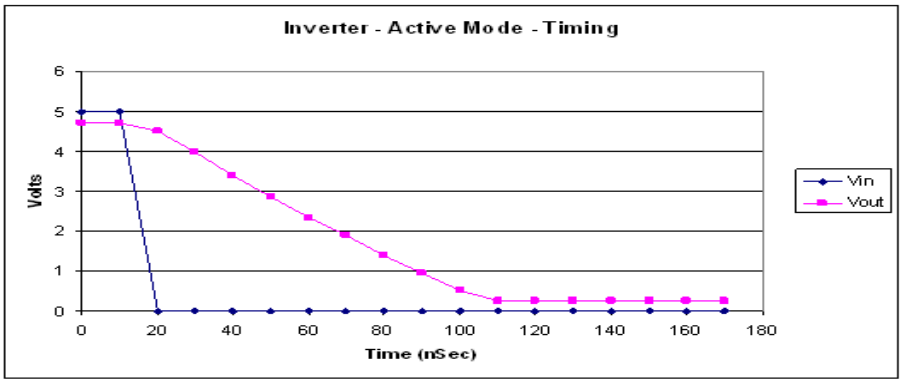
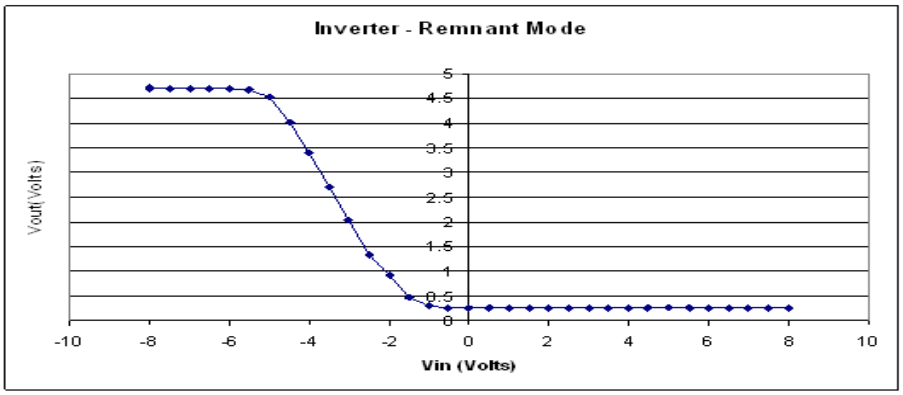
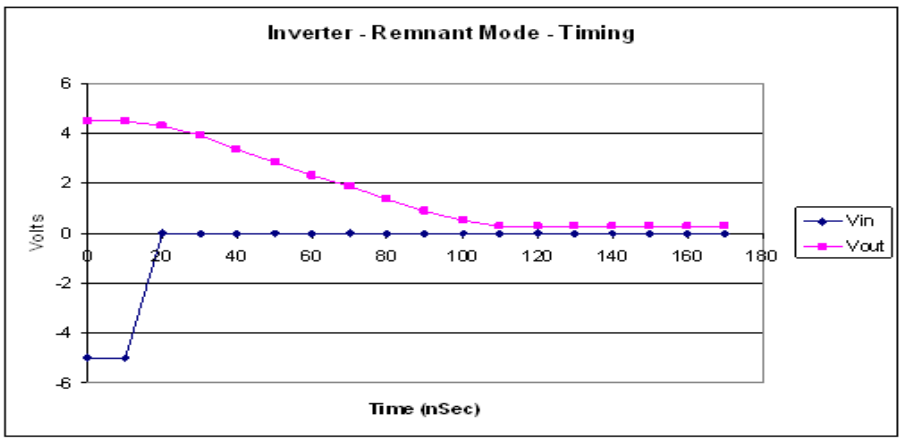
The use of ferroelectric materials for digital memory devices is widely researched and implemented, but ferroelectric devices also posses unique characteristics that make them have interesting and useful properties in digital circuits. Because ferroelectric transistors possess the properties of hysteresis and nonlinearity, a digital inverter containing a FeFET has very different characteristics than one with a traditional FET. This paper characterizes the properties of the measurement and modeling of a FeFET based digital inverter. The circuit was set up using discrete FeFETs. The purpose of this circuit was not to produce a practical integrated circuit that could be inserted directly into existing digital circuits, but to explore the properties and characteristics of such a device and to look at possible future uses. Input and output characteristics are presented, as well as timing measurements. Comparisons are made between the ferroelectric device and the properties of a standard digital inverter. Potential benefits and possible uses of such a device are presented.


Inverter - Active Mode
Vout(Volts)
Vin (Volts)


Inverter - Active Mode - Timing
Volts
Time (nSec)
Vin
Vout


Inverter - Remnant Mode
Vout(Volts)
Vin (Volts)


Inverter - Remnant Mode - Timing
Volts
Time (nSec)
Vin
Vout